blished by the ventricular systole, continuous with that of the arteries. Where there is no motion of fluid, there can be no murmur; consequently, simple roughness of the mitral valve by exudation, or otherwise, will not give rise to a murmur with the first sound unless the valve be also insufficient.

3. The mechanism by which the valves of the arteries are closed, is similar to that of the auriculo-ventricular valves. Immediately on the contraction of the ventricles, the pressure of the blood attained in the large arterial trunks, acting equally in all directions, effects the closure of the semilunar valves. Their complete closure occurs cotemporaneously with the end of the ventricular systole. When the ventricular diastole begins, the arterial retraction commences, and the wave of reflux from the large arteries falls upon the valves already closed, and thus is produced the clear second sound. There is no regurgitation, which would necessarily be the case to a certain extent were the valves shut only by the returning wave of blood.

4. The first sound of the heart is occasioned by the vibration of the tense auriculo-ventricular valves, acted on by the blood propelled against them during the systole of the ventricles, and the vibration of the chordæ tendineæ. In like manner, the second sound is produced by the impulse of the blood on the semilunar valves already shut, and not by their closure.

5. A double or even a treble sound is sometimes heard over the ventricles, which has been ascribed to various causes, but is probably due to a double vibration of the tense auriculo-ventricular valves—just as a sail struck by the wind may emit several sounds. The same explanation is given when the phenomenon occurs with the second sound.

In contraction of the mitral orifice, there is occasionally heard a peculiar sound termed *cliquetis métallique*, or "audible heart impulse," and of which different explanations have been offered. According to the author's experience, all true heart sounds are heard by mediate or immediate auscultation only. This sound, however, is heard at a distance from the chest, and is hence presumed by him to depend on the motion imparted by the heart's systole to the surrounding elastic tissues.

6. Morbid conditions of the muscular structure of the heart can have no effect in preventing closure of the valves.

7. As the small specific gravity of the valves is assumed to facilitate their closure, anything which can render them specifically heavier, as fibrinous deposits, in the case of debilitated individuals whose blood is of low specific gravity, may be conjectured to interfere with their action. It is in such cases that the re-establishment of an improved condition of the blood removes the murmur, as in typhus fever, severe pneumonia, &c. On similar principles, the author adds, the bruits observed in chlorotic patients, may perhaps be explained.—*Prager Viertel-jahrschrift,* 1847, vol. xi.

[We witnessed the experiments referred to in this paper, when performed by Dr. Hamernik, and have much pleasure in testifying to their accuracy. The experiment, by which it is shown that the auriculo-ventricular valve is closed before, and independently of the ventricular systole, is very easy of performance.

The valves, when cut out of the heart, are found to float readily on the surface of the blood; and probably their specific lightness plays a part in the mechanism of their closure, at least in the human subject; at the same time, that it is far from being essential is indicated in prone animals, and in the case of a man standing on his head. The seat of chlorotic murmurs prevents our attributing them to the cause hinted at by the author.]—*Monthly Retrospect,* Jan. 1849.

ORGANIC CHEMISTRY.

4. *Nature of the Gastric Juice.*—There is even, at the present time, a difference of opinion among chemists, with respect to the nature of the acidifying principle of the gastric juice. Some imagine that the acidity of this liquid is

due to lactic acid, others to hydrochloric acid, and a third party attributes it to the presence of the superphosphates. M. Schmidt, without making any direct experiments upon the subject, is inclined to think that the acidity is occasioned by a complex acid, which, under the influence of heat, is decomposed into hydrochloric acid and pepsine. Liebig, in common with some other chemists, denies the existence of free hydrochloric acid in the stomach; and he believes that, when it is obtained by the simple distillation of the gastric juice, it is formed by the reaction of the lactic and phosphoric acids, which are present in it, on the chlorides; and that they thus give rise to the production of free hydrochloric acid. LEHMANN has recently made a new examination of this subject; and he finds that, when he operates upon the stomachs of dogs, which are placed in a vacuum, in such a manner as to cause the vapours from the gastric juice to traverse a tube containing a solution of nitrate of silver, there is not any indication of free hydrochloric acid, until the concentration of the liquid has been carried so far as to permit the action of the lactic acid on the earthy chlorides. His observations, therefore, confirm the remark of Liebig, as well as the results of Bernard and Barreswill, as to the nature of the acid in the gastric juice.—*Brit. and For. Med.-Chir. Rev.*, Jan. 1849, from *Archiv der Pharm.*

5. *On the Changes which Organic Substances suffer on their passage into the Urine.*—Messrs. WÖHLER and FRERICHS have caused a series of substances, of known composition, whose transformations, under the action of reagents, are also well defined, to pass through the organs of different animals (dogs, rabbits, guinea-pigs, &c.), under favourable circumstances for collecting the excrement and observing the action of the different substances.

Salicylous acid, given with the food in doses of ½ to 4 grammes, was detected unchanged in the urine, not having been converted into hippuric acid, as might have been expected from its isomerism with benzoic acid.

Oil of bitter almonds, free from hydrocyanic acid, was not found to exert a poisonous action, as has been stated by other experimenters. The urine, after its administration, contained hippuric acid. It is therefore converted, by the addition of 2 atoms of oxygen, into benzoic acid, which is subsequently converted into hippuric acid.

Amygdalin is not poisonous; there is, therefore, no substance in the body which can perform the function of emulsion. In two cases only, when given in large doses, it produced drowsiness, from which the animals, however, soon recovered. The breath then gave off an odour of hydrocyanic acid. In other cases these symptoms were not observed, while the urine in all cases smelt strongly of the acid, when mixed with milk of almonds. A portion, therefore, of the amygdalin may have passed off by the kidneys.

Benzoic ether was traced as hippuric acid in the urine.

Peruvian balsam also afforded hippuric acid from the cinnamic acid which it contains, and another substance, which caused the urine to assume a blood-red colour with hydrochloric acid.

Tannic acid was converted into gallic acid, pyrogallic acid, and substances bearing a resemblance to humin.

Urates and alantoin. The normal quantity of urea was increased 5-fold in the urine of a rabbit by a dose of 2½ grammes of urate of potash.

Oxalate of lime was found in considerable quantity, with an increased amount of urea in the urine both of man and the dog, after having taken urate of potash.

Allantoin, the other product of the decomposition of uric acid by peroxide of lead, was unsuccessfully sought in the urine.

Allantoin, given in considerable quantity, could not be detected in the urine, nor oxalate of ammonia, the product of its decomposition by boiling potash.

Sulphocyanide of potassium did not exhibit a poisonous action, as has been previously stated by other observers, but it appeared to diminish the activity of the spinal marrow. The sulphocyanide was always detected unchanged in the urine.

Rhodallin, or the combination of oil of mustard with ammonia, was found as